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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,504	12/12/2003	Charles Augustus Choate IV	BUR920020015US2	1005

7590

06/29/2006

IP Law Department, 972E  
IBM Corporation  
1000 River Street  
Essex Junction, VT 05452

EXAMINER
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BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

10/734,504

Applicant(s)

CHOATE ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9-16 and 21-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-16 and 21-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date 12/12/03.
- 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

The substitute specification filed 4/8/04 has not been entered because it does not conform to 37 CFR 1.125(b) and (c) because: the statement as to a lack of new matter under 37 CFR 1.125(b) is missing. Also, the drawings submitted with the substitute specification are defective.

Claims 22-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 22 recites "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source", but specification as originally filed did not disclose this "means for isolating". Therefore, claim 22 includes new matter. Also, claim 22 recites "an impurity source coupled to the impurity cell" in combination with the "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source". The specification as originally filed did not disclose these two features together. For this reason also claim 22 includes new matter. Also, the specification as originally filed did not include the two above quoted limitations of claim 22 in combination with the new claim 23 limitation of "wherein the impurity cell remains in the deposition chamber during charging from the impurity source". Therefore, claim 23 in particular includes new matter. It is noted that the claim 23 limitation of "wherein the impurity cell remains in the deposition chamber during charging from the impurity source" appears to

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contradict the claim 22 limitation of "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source". If the impurity cell is located in the deposition chamber then it is not isolated from the deposition chamber. Applicants are respectfully requested to provide the page and line numbers of their specification, which provides support for the above discussed, claim limitations.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). If for argument's sake the above identified claim language is not new matter, then correction of the following is required: Claim 22 recites "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source", but specification as originally filed fails to provide proper antecedent basis for this limitation. Also, the specification as originally filed did not include the above quoted limitation of claim 22 in combination with the new claim 23 limitation of "wherein the impurity cell remains in the deposition chamber during charging from the impurity source".

Claim 23 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim 23 limitation of "wherein the impurity cell remains in the deposition chamber during charging from the impurity source" appears to contradict the claim 22 limitation of "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity

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source". If the impurity cell is located in the deposition chamber then it is not isolated from the deposition chamber.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-16 and 21 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kikuchi (JP 54-96360) (see Figs. 1-3 and the attached English translation, for example) or Igarashi (5,421,896) (see Figs. 6 and 7B, for example) each of whom discloses an apparatus that has an inherent capability of incorporating an impurity in a thin film, the apparatus comprising an impurity in an impurity cell. Regarding the use of carbon as an impurity in a silicon thin film, the article by Iyer (Appl. Phys. Lett. 60 (3)) is cited of interest to show that carbon was known in the prior art as an impurity for incorporation into a silicon thin film. It is

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noted, however, that none of the presently pending apparatus claims require the presence of a silicon thin film or the presence of any other particular type of substrate to be treated.

Claims 22 and 24-32 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Igarashi (5,421,896) (see Figs. 6 and 7 and col. 5, lines 30-45, for example) who discloses an apparatus for incorporating an impurity in a thin film. The apparatus comprises an impurity cell 17 and means for introducing one or more gases for forming the thin film. The impurity cell 17 is mounted to the growth chamber 16 by means of flange 15, which is connected to flange 21 of the growth chamber. Therefore, the impurity cell 17 is designed so that it can be removed from the growth chamber. When it is removed from the growth chamber it is isolated from the growth chamber, and in that isolated condition it can be charged with a carbon filament from a source of carbon filaments. Such a step of mounting a new carbon filament in the impurity cell 17 while the impurity cell is removed from the growth chamber would read on the claim 22 limitation of "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source".

Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi (5,421,896) taken in view of Iyer (Appl. Phys. Lett. 60 (3)). If, for the sake of argument, claims 25 and 26 were considered to require a source of silicon vapor, it would have been obvious to one skilled in the art to modify the apparatus of Igarashi by providing it with a silicon MBE source, because Iyer teaches that it is desirable to form a

silicon film by MBE, wherein the silicon film contains a carbon impurity produced by a carbon source such as that of Igarashi.

Claims 9-16, 21, 22 and 24-32 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Parker (The Technology and Physics of Molecular Beam Epitaxy, pages 15-22, 55 and 62). Figs. 1 and 3 of Parker illustrate a conventional MBE apparatus for deposition of AlGaAs, for example, the source cells for dopants or for Al are impurity cells as presently claimed. Regarding claim 10, Parker teaches (see page 62) the use of Ge as a dopant source material. Regarding claim 22, the source cells of Parker can be detached, separated and isolated from the deposition chamber for charging with a source material. Regarding claims 11, 12, 25 and 26, the MBE apparatus of Parker has an inherent capability of being used for the intended use recited in these claims.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parker (The Technology and Physics of Molecular Beam Epitaxy, pages 15-22, 55 and 62) taken in view of Yamamoto (JP 62-165318) (see Figs. 1-4) who discloses an apparatus for charging an MBE source cell 2 wherein the cell remains in the deposition chamber during charging from a source of material 4. It would have been obvious to provide an MBE apparatus of the type described by Parker with a source cell charging means of the type taught by Yamamoto. It would have been obvious to provide such a source cell charging means for any of the source cells of Parker, including the dopant cell sources or the Al cell source, any of which are impurity cells. Also, the apparatus of Yamamoto includes shutters that isolate the MBE source cell 2 and also the material source 4.

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These shutters of Yamamoto are "means for isolating the deposition chamber from the impurity cell and the impurity source such that the impurity cell can be charged from the impurity source" as recited in claim 22.

Claims 9-16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sarraf (5,558,720) taken in view of Galliard (4,606,296). Sarraf (see the Fig., for example) discloses an apparatus that has an inherent capability of incorporating an impurity in a thin film, the apparatus comprising an impurity in an impurity cell.

Regarding the use of gallium as an impurity in a silicon thin film, the article by Fathauer (J. Appl. Phys. 64 (8)) is cited of interest to show that gallium was known in the prior art as an impurity for incorporation into a silicon thin film. It is noted, however, that none of the presently pending apparatus claims require the presence of a silicon thin film or the presence of any other type of substrate to be treated. Sarraf does not discuss the location of his MBE cell with respect to the MBE deposition chamber. Galliard (see Figs. 1-3), however, shows that MBE cells are conventionally located in the MBE deposition chamber, and it would have been obvious to locate the evaporator cell 28 of Sarraf in the deposition chamber because Galliard makes clear that MBE apparatus conventionally include the evaporator cell in the deposition chamber.

Claims 22-32 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ku (6,299,692) (see Figs. 1 and 2, for example) who discloses an apparatus for incorporating an impurity in a thin film on a substrate arranged in a deposition chamber. The apparatus of Ku includes a vertical cavity 22 with a well-like end 26 at the bottom of the cavity (see col. 4, lines 41-48 of



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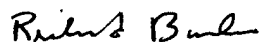
Ku). It is noted that the definition of "cell" is "a small compartment, cavity or bounded space" (see attached dictionary definition), so the cavity 22 and/or the well-like end 26 of Ku is a cell. Also, the cell 22 of Ku is charged with droplets of liquid precursor material (PDEAT for example, as described by Ku at col. 1, lines 27-39), which are then vaporized. Also, the cell 22 is isolated from the deposition chamber by the wall surface 32 which has openings that allow gas to diffuse into the process chamber. Therefore, Ku's apparatus has "means for isolating" as recited in claim 22, at least to whatever extent applicant's disclosed apparatus includes such a "means for isolating". Also, a source of coating material is coupled to the cell of Ku as recited in claim 22 and the cell remains in the deposition chamber during charging as recited in claim 23. Also, Hautala (see col. 2, lines 1-5) has been cited of interest to teach the fact that thin films that are deposited using a source material such as PDEAT will inherently include impurities such as carbon that are incorporated into the thin film during deposition. Therefore, when Ku's vaporizer cell is used to supply PDEAT vapor, it is inherently an impurity cell. It is noted also, however, that Ku's apparatus has an inherent capability of delivering other types of precursor compounds, including hexane if so desired. Also, apparatus claims 22-32 are not limited by a recitation of intended use such as the type of precursor compound to be used.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Richard Bueker  
Primary Examiner  
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